



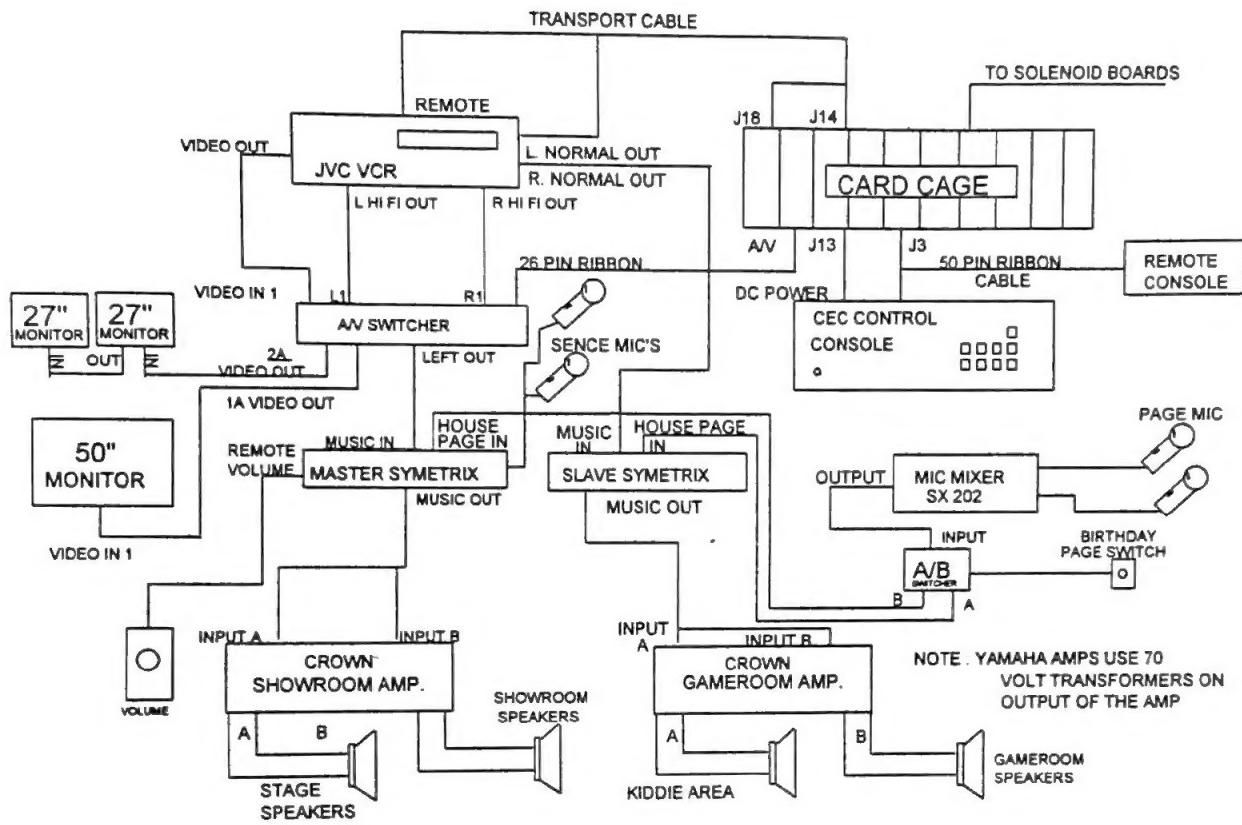
# 1997 Technical Seminar

## Animation Overview



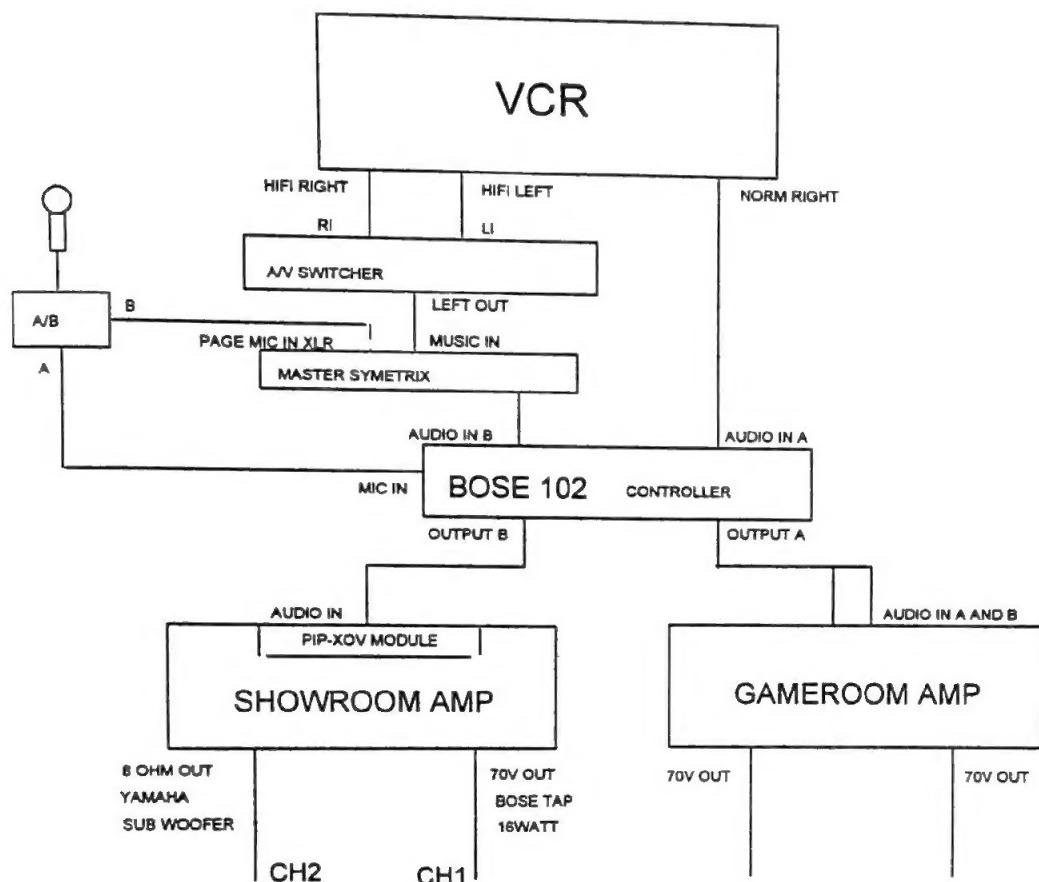
1. Brief theory of operation.
  - A. Audio flow.
  - B. Data flow.
  - C. CPU operation.
2. Common Audio Problems.
  - A. Fluctuating volume.
  - B. No audio.
  - C. The 70 volt audio layout. -Theory.
3. Movements troubleshooting.
  - A. Electronics theory of operation.
  - B. Testing electronics.
  - C. Repairs. -Electronics
4. Lighting troubleshooting
  - A. Theory -Compared to movement operational theory.
  - B. Testing Electronics.
  - C. Repairs.
5. Recommendations.
  - A. Tripp-Lite line conditioners.
  - B. VCR button covers.
  - C. Chip kits. -CPU, Switcher, etc.
  - D. Backup tapes and their functions.

## R 1&2 Stage Animation Connections



## 1&2 Stage Animation Bose Sound System Layout

# BOSE SYSTEM AUDIO LAYOUT



### PIP.XOV MODULE SETTINGS

- S1. A
- S2. A
- S3. A
- S4. B
- S5. B

THE REGISTERS TO BE CHANGED FOR  
100HZ ON LOW PASS.

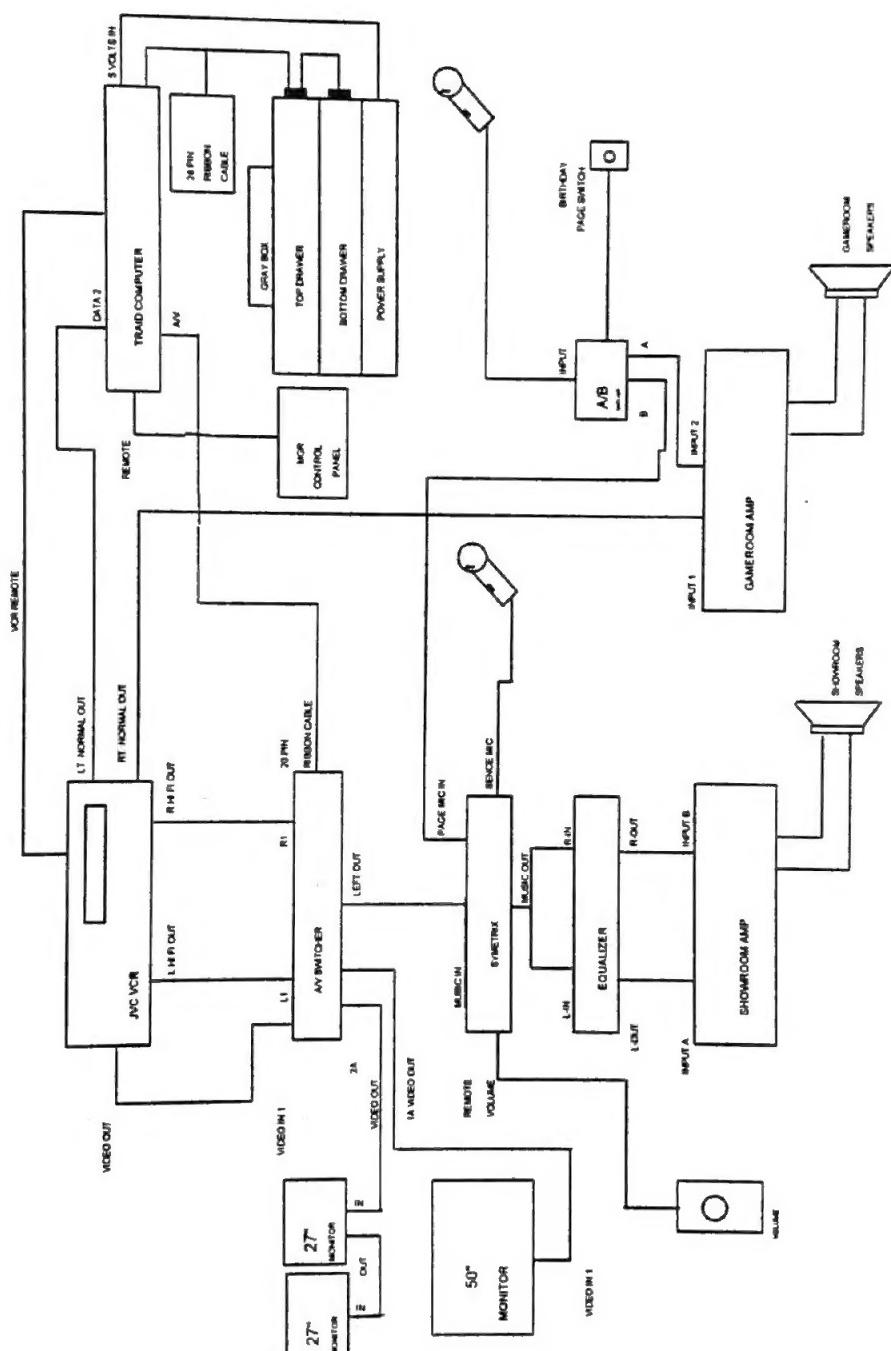
- R1, R2, R3 - 68100 OHMS
- R4 - 52300 OHMS
- R5 - 20500 OHMS
- R6 - 357000 OHMS

### BOSE 102 CONTROLLER SETTINGS

- |                       |        |
|-----------------------|--------|
| B MUTE SWITCH         | OFF    |
| INPUT LEVEL SWITCH 1V | -1V    |
| MIC / LINE SWITCH     | MIC    |
| FRONT BASS SWITCH     | NORMAL |

- \* ALL THE SETTINGS ARE PRESET BY  
CAPITOL DESIGNS GROUP.

### 3 Stage Animation Connections



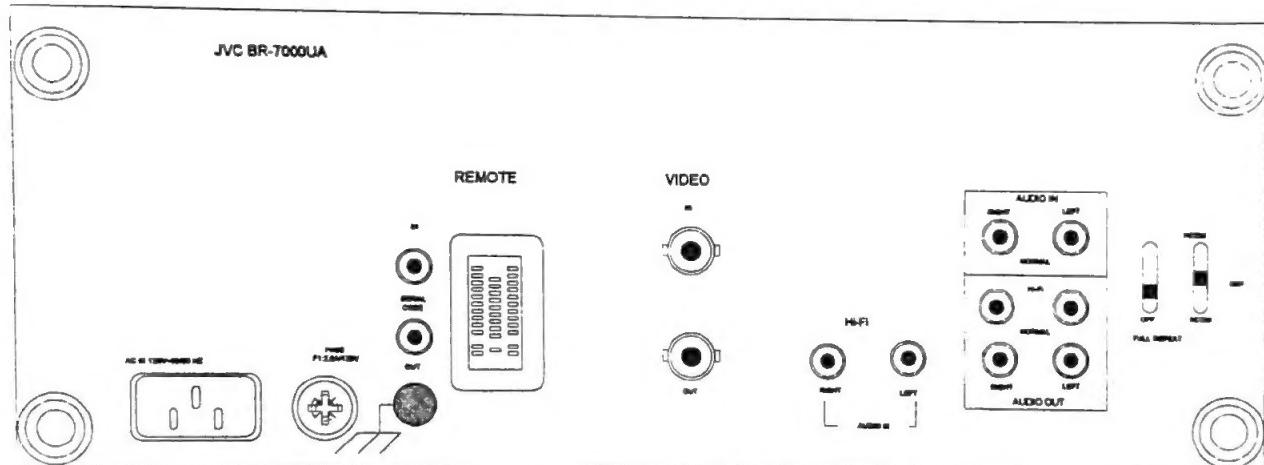
## THE JVC BR 7000

The VCR is the source for the audio, video and the data for the characters.

The BR7000 VCR is a commercial grade VCR that is widely used in TV stations and duplicating houses. The BR7000 VCR is a Four Audio Track VCR. Two of these tracks are Hi Fi and are responsible for reproducing the audio for the showroom. The other two are normal tracks, one reproduces the data for the characters.

The head cleaning is not necessary for several thousands of hours. (The video heads should be cleaned by the approved head cleaning kit and only when it is recommended by the Technical Support Department.)

- The **remote connector** allows the animation computer to stop, play, and rewind the cassette. The connector also sends a signal indicating when the vcr has stopped playing or rewinding.
- The **normal left audio output** is where the animation data signal is located.
- The **hi-fi left audio output** is where the showroom audio signal is located.
- The **normal right audio output** is where the background music signal is located.



Backside of JVC BR 7000 vcr

## THE A/V ROUTING SWITCHER

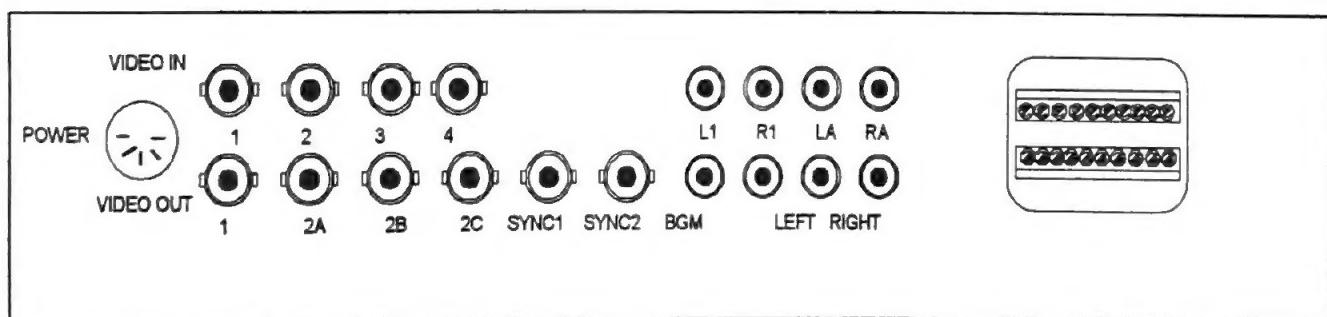
The A/V Routing Switcher sends audio and video to the proper channels, depending on what has been selected or programmed. The programming for the AV switcher is received continuously from the animation computer via a ribbon cable. The AV switcher has BNC connectors for video, and RCA connectors for audio located in the rear. The connectors that run across the top are for input, the connectors on the bottom are for outputs.

The AV switcher has its own external power supply known as an Elpac. The Elpac provides the AV switcher with +5vdc, +12 vdc, and -12vdc. When plugging in the Elpac, always plug in the DIN connector first and the AC plug second. If not, the A/V switcher may not sync up properly.

**DO NOT PLUG THE DIN CONNECTOR FOR THE SHOW CONTROLLER INTO THE AV SWITCHER, or vice versa.**

The front panel of the AV switcher has no power indicator. If you suspect the AV switcher is bad, be sure to double check the power connects. The home office parts department also carries chip kits that contain the most commonly failed chips. You must have one as part of your spare parts inventory.

- **Video in #1** is where the video signal from the vcr is received.
- **L1** is where the left hi-fi signal from the vcr is received.
- **R1** is where the right hi-fi signal from the vcr is received.
- **Video out #1** this is a switched output for the video signal. The video signal is only present here for video monitors on the stage that can not be seen when the stage curtains are closed.
- **2A** is the video out connector that currently is programmed to give a constant video output. Connect your ceiling monitors to this connector.

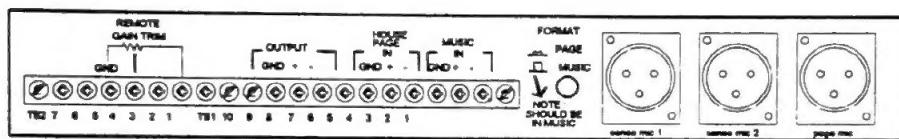
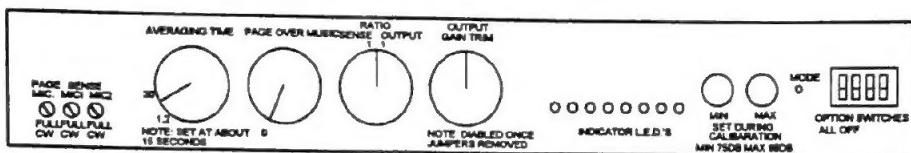


Backside of AV Switcher

## The Symetrix

The Symetrix is used to automatically adjust the volume of the show in the Show room. It is imperative that the Symetrix is properly calibrated. If it is not, you will have poor sound quality in your store, and may experience other difficulties with your sound system.

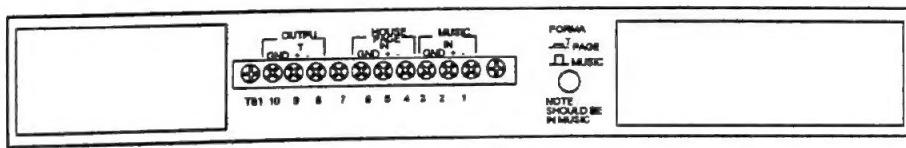
### Master Symetrix 571 SPL Settings



### Slave Symetrix 571 S Settings



### Rear View Of Slave Symetrix



<b>Symptoms</b>	<b>Probable causes</b>
Fluctuating volume	Video cassette. Symetrix needs calibrated. Average time set too low or too high. Sense mike not operational. Volume control pot / connections.
Low volume	Sense mike not operational. Volume control pot / connections. Controls not set properly.

#### **Testing sense mike:**

1. Turn the average time delay down to 1.2 (Fully counterclockwise)
2. Use a wooden dowel rod (Broomstick handle), and gently thumb the microphone repeatedly. Audio in showroom should increase and lower once the thumping the microphone is stopped.

#### **Testing volume control pot:**

1. Place a multimeter at the GND (TB2-5) and Wiper (TB2-4) connections on the potentiometer from the manager control panel.
2. Slowly turn the pot from one direction completely, then to the other direction. You should notice a voltage change as the potentiometer is being turned. This shows that the potentiometer is good because of the changing voltage, which also verifies that the connection between the two is good. If no voltage change is detected, check connections at potentiometer. Voltage should always be present. If not, connection is broken.

#### **Calibrating the Symetrix:**

1. Set your Showroom AMP's to 75% on. If you have a Bose Sound System, set your Bose speaker channel to 7 and your sub base channel to 5. You are now ready to begin calibration.
2. Put in a showtape. During the back ground segment of your tape is when you should calibrate. Have your assistant stand by in the middle of your Showroom with the sound level meter (under your sense mic(s)). Holding the meter parallel to the ground, bring the meter to chest level and set the range to 70.
3. Press the MODE button on your Symetrix once. You may now adjust your minimum level with the minimum control potentiometer. Set this to 75 db. Have your assistant use hand signals "thumbs up" for higher or "thumbs down" for lower. The meter should read between +4 and +6 db with it set on the 70 DB range.
4. The Symetrix will read your final setting for eight (8) seconds, then it will switch to the setting. Quickly have your assistant set the range on the meter to 90 db. Using the maximum control potentiometer, set your maximum setting to 95 db. Again the sound level meter should be reading in between +4 and +6 db with the range at 90 db. After eight (8) seconds of your final setting, the Symetrix will return to normal operation. If you are unable to reach the 75 db and 95 db settings, you may have to change the gain on the showroom amp.

## **Animation Computer Operation**

Below is an overview of the proper operation of the animation computer. By understanding everything that should be happening, troubleshooting a down show could be identified more easily.

### **Power Up**

Upon power up, the following message should be displayed:

**32K RAM OK  
ROM CHKSUM=1676**

After a few seconds the display changes to:

**SERIAL# 0110 R  
R021 L021**

So far, by watching the display, we now know these things:

- A. The CPU has power.
- B. The ram chip is functioning.
- C. The serial Number of the CPU is 0110 (Should match label on CPU)
- D. The validation code for the Regular show is: 021
- E. the validation code for the Live show is: 021
- F. The animation is set to a 'Rocker' type stage layout.

If you insert a tape, and the tape is ejected within a minute of the vcr going into play, make sure the validation codes for the cassette match that of the display. If the numbers are different, the tape will not play, if the numbers on the LCD are distorted, then the validation codes are corrupted.

**TIP:** Even if the validation code(s) are corrupted, or not correct, the generic show tapes should still work; They do not use the validation codes for authorization to play.

After a few more seconds the display changes to:

**Cyberstar V1.6 R  
© 1993**

So far, everything that relates to the CPU seems fine. It is time to insert a cassette into the vcr.

When the animation computer 'senses' that a tape has been inserted into the vcr, the animation computer will activate rewind on the vcr, to rewind the cassette.

When the rewind cycle is complete, the vcr will stop. The animation computer will 'see' this stop action, and then display the following message:

**TAPE START**  
© 1993

After a couple of seconds, when the 'carrier' signal is first detected by the computer, the display will look like the following:

**TAPE START**

After a short moment, the display will read:

**TAPE START**  
\*\*\* R021 L021

This display shows that the cassette has passed the validation verification scan. The next display should show you the name of the show.

**-WHOOOMP-CEC-**  
©-04/97-SEPT

This display shows us that the animation computer is working properly, and that the data is being read and interpreted correctly. The name of the show is displayed by using the data signal on the tape that gives the animation computer the instructions to display the message. This is the same exact data that will be interpreted and decoded to make the characters move, and the lights to function.

What does the following display tell you?

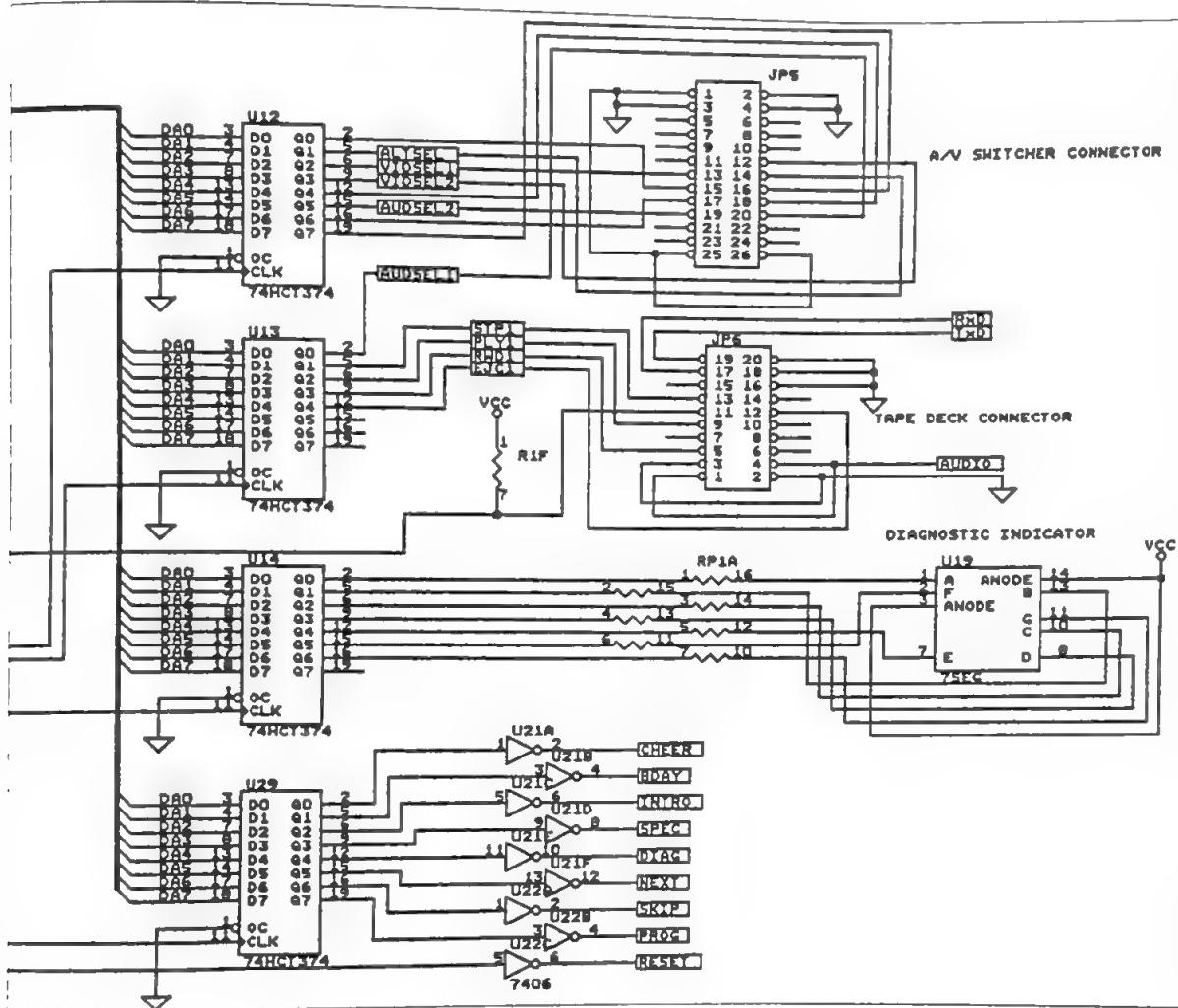
**TAPE START**  
\*\*\*#

If the display shows a pound sign after the asterisks, and ejects the tape, there was a problem. The two reasons could be:

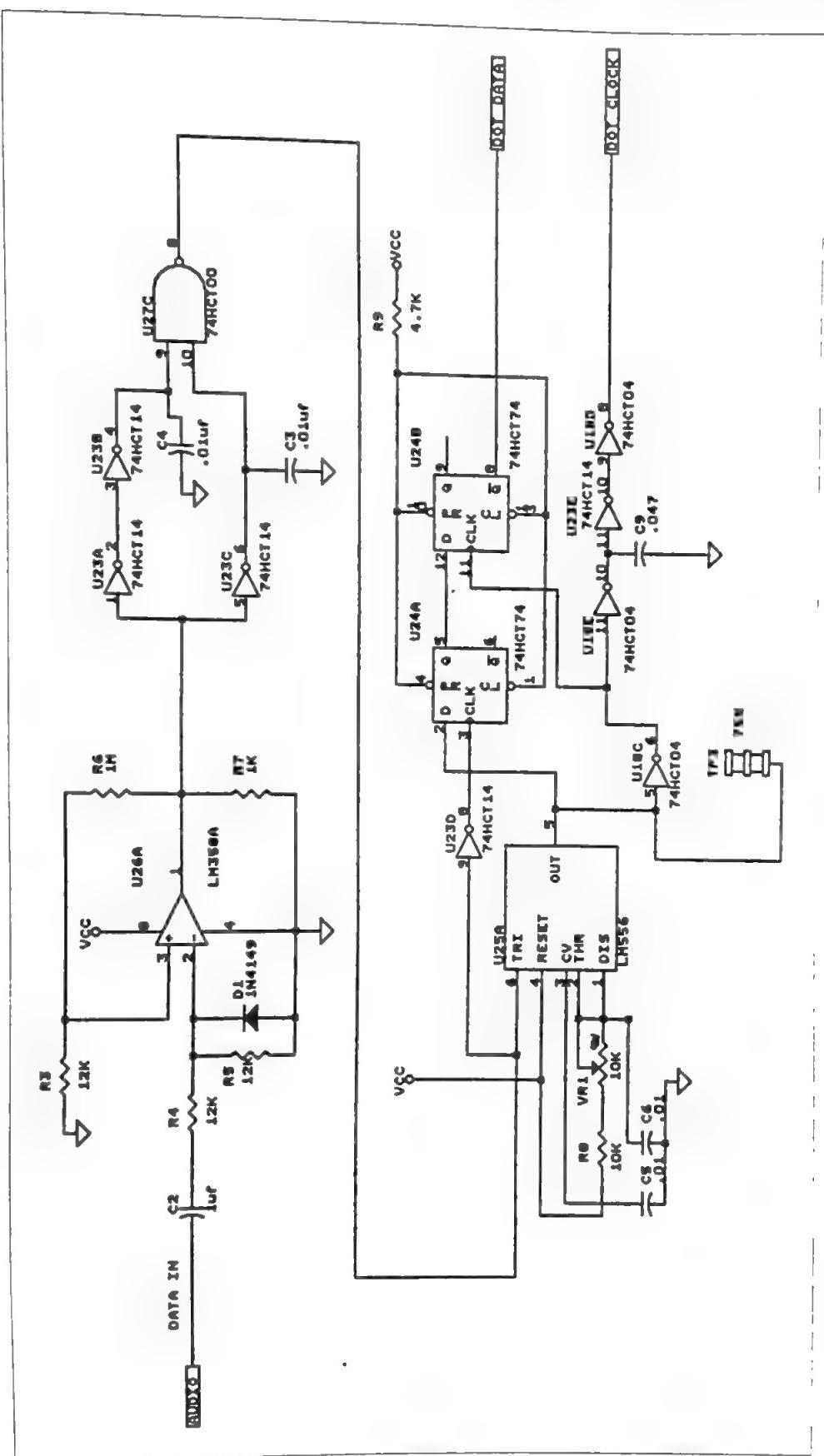
1. No data is being received to the computer, and the tape will eject after 40 seconds automatically.
2. The cassette did not pass the validation code scan, and was ejected.

If this happens, try playing a generic tape. Since they do not have a validation code, then they should still play. If the problem was because the animation computer does not hear the data signal from the vcr, the tape will eject again.

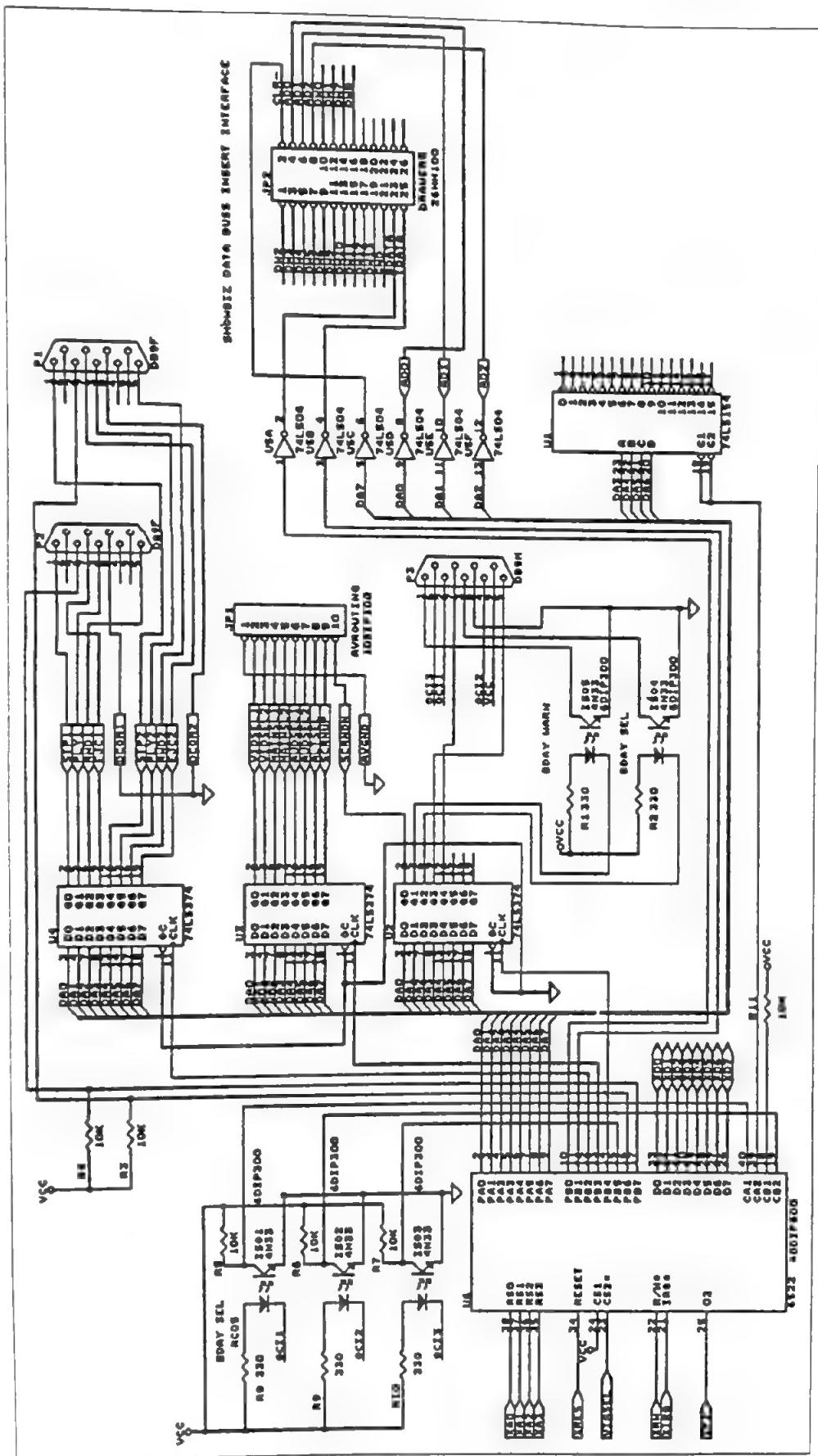
## 68HC11 CPU Schematic -Partial



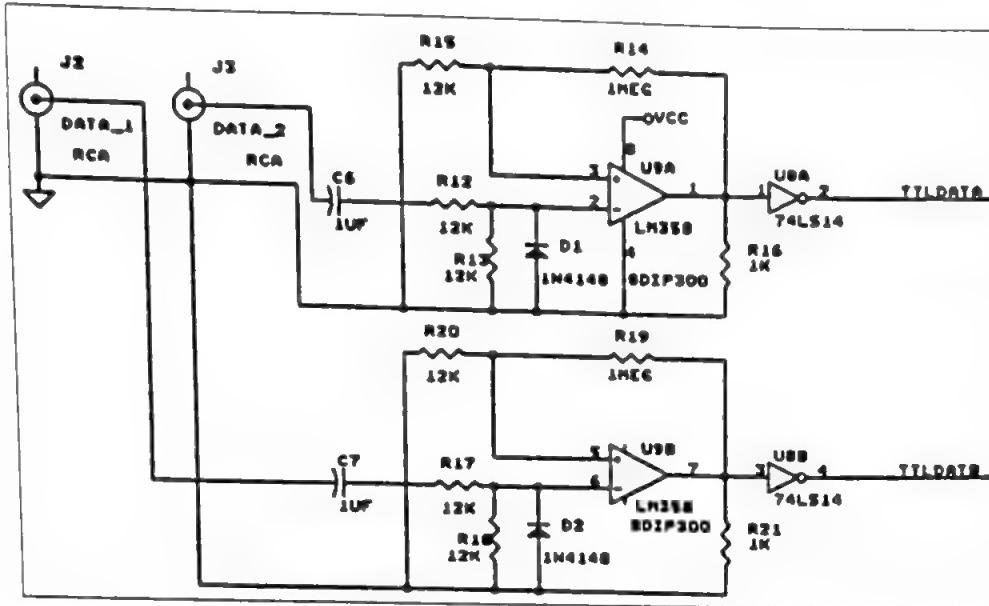
## **68HC11 CPU Schematic -Partial II**



## Cyberstar Schematic / 3 stage computer -Partial



## Cyberstar Schematic / 3 stage computer -Partial



## **Components on the animation computer and their function**

### **68HC11 CPU Card**

Manager control panel lights: U21-7406, U29-74HCT374

AV Switcher Control: U12-74HCT374

VCR Control: U13-74HCT374 - *F-10 1, - - most.*

- LCD Displays 'APE START' -T disappears or never is displayed.
- Tape doesn't eject, keeps playing.
- Does not display name of show on LCD.
  1. Check auto-repeat switch is in the off position on vcr.
  2. Check transport cable connections -On J19, check for bad ground connection.
  3. Component U23.
- If 120V short to gnd.
- CPU causes character card led's to flicker.
  1. Replace U5 -68B21.
  2. Replace U9 -74HCT245N.
  3. Replace U8 -74HCT245N.
- If tape start does not come up and display remains on 'Cyberstar' title.
  1. Replace U13 -74HCT374N.

### **Triad Cyberstar: 3 stage animation computer**

CPU not reading data signal: Cyberstar: U9 -LM358, U8-74HCT14

Manager panel lights and panel: IS04, IS05-4N3333, U2-74LS374

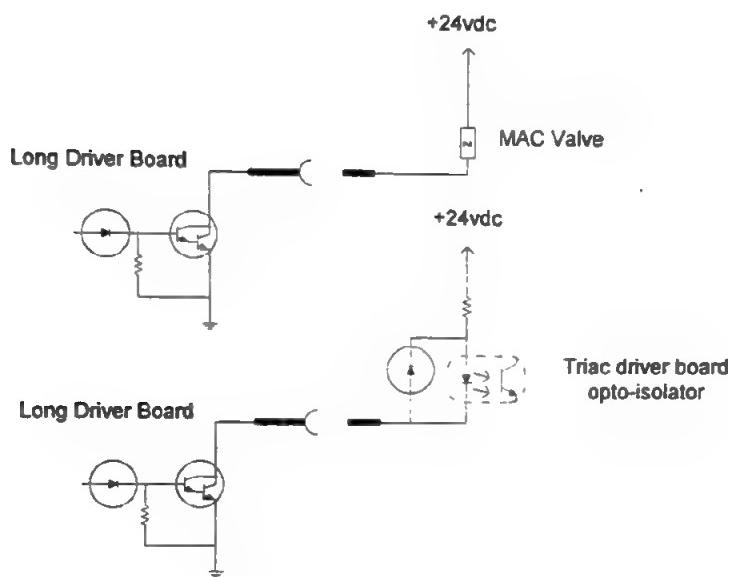
Tape deck control: U4-74LS374

AV Switcher Control: U3-74LS374

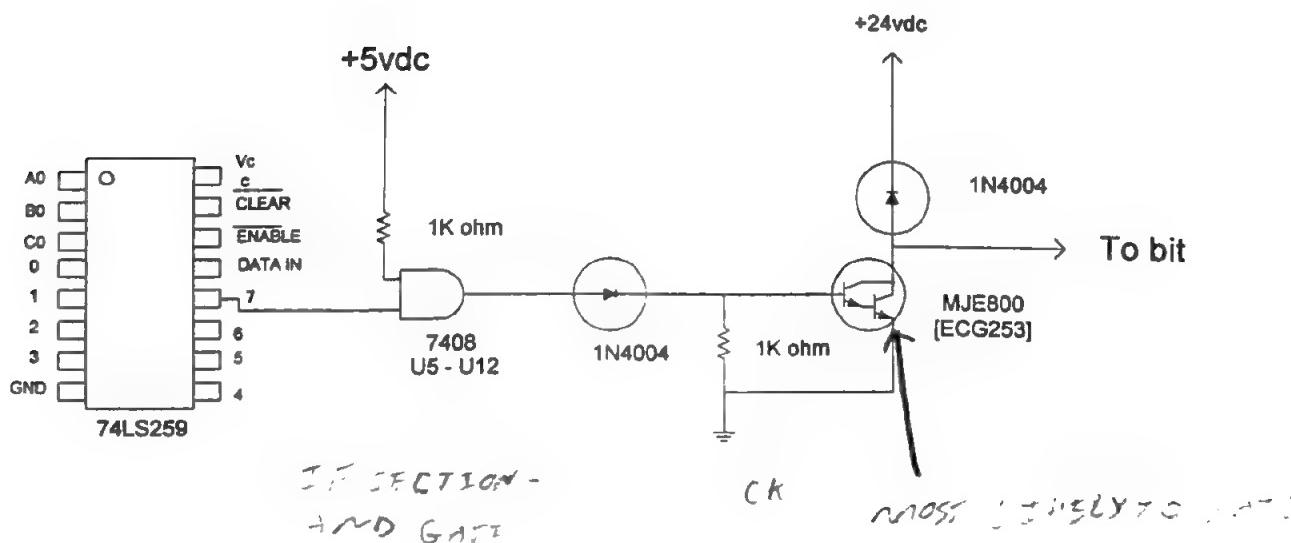
## Character movements explained.

We all know that the movements of the characters are caused by a solenoid valve activating, and causing a cylinder to move. The part I am going to explain, is how the animation computer activates the solenoid valve.

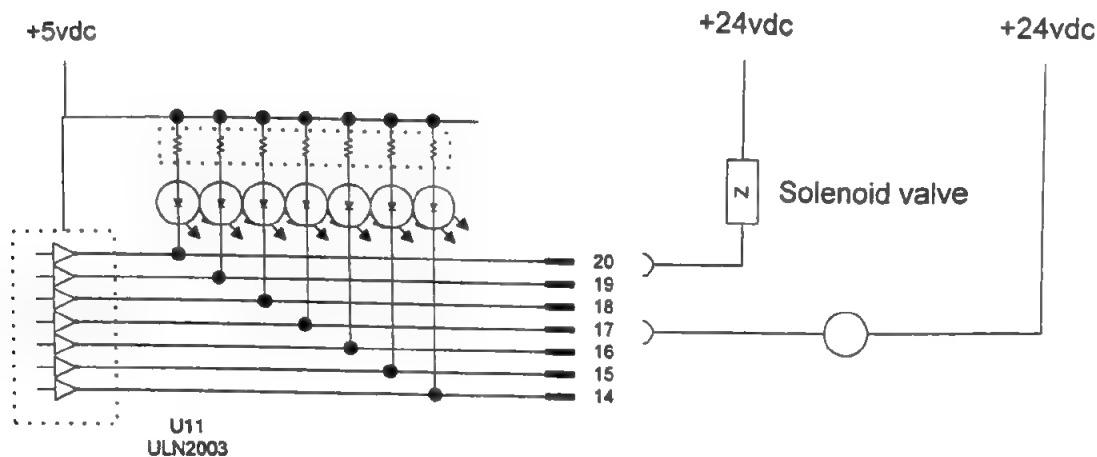
The theory used is very similar to the way a pinball game would activate a kicker. The coil is wired 'hot', and the drive transistor would be activated, and allowing the voltage to go to ground.



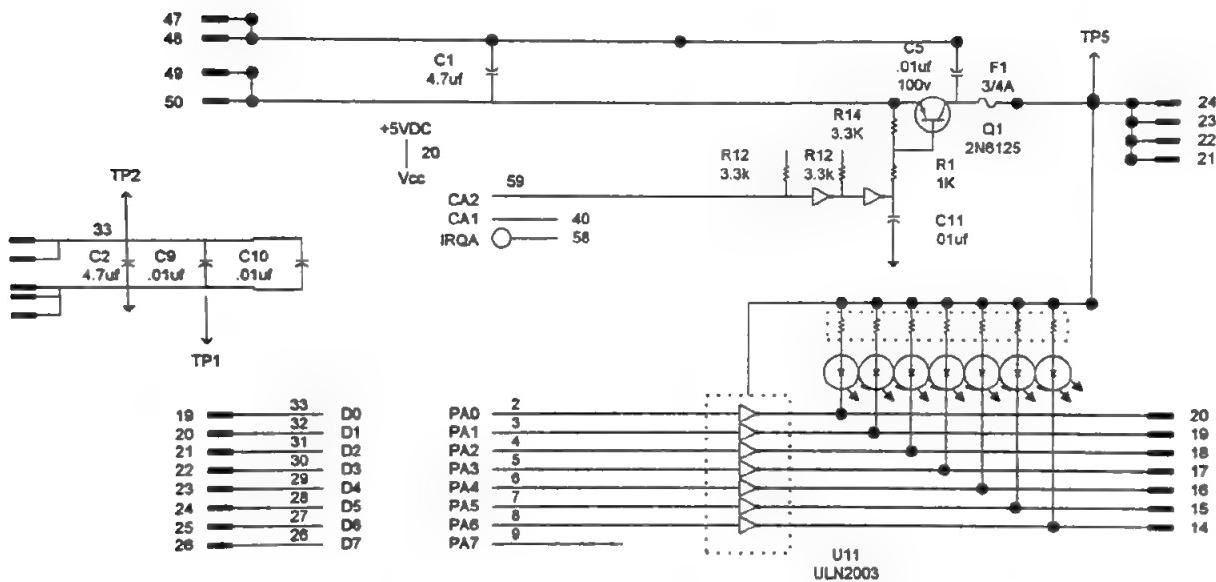
Long Driver Board Schematic -Partial



The drawing below shows how the character or light driver card will activate a device. When the 6821 IC activates the corresponding inverter, the pulse will cause the inverter output to go low, and connect a path to ground for the led and the device connected via the ribbon cable.



## Character Driver Card Schematic -Partial



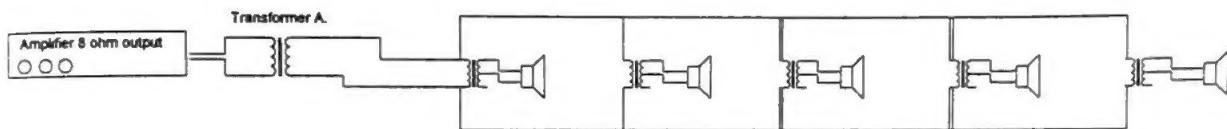
## 70 volt audio systems

The 70 volt audio layout is a common method of connecting multiple speakers to a single channel of an amplifier without having to worry about loss of impedance. By using transformers, the audio signal from the amplifier can be tapped by wattage-per-speaker. This is great when powering sound systems such as the Bose speaker system, and the speaker layout in the gamerooms.

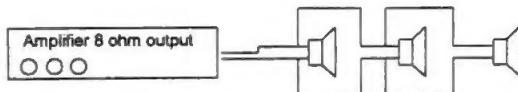
The drawing below show a typical 70 volt setup. Some amplifiers will have a 70 volt switchable output, some do not. The drawing shows an amplifier with an 8 ohm speaker output. In order to connect 5 speakers which are rated at 8 ohms each, adding transformers is needed.

The first transformer (A) raises the output voltage to a 70 volt constant. Each transformer connected to a speaker will tap a predetermined amount of wattage from the 70 volt line and provide the speaker with an 8 ohm signal.

If the amplifier below is rated at 100 watts, we could tap each speaker for 20 watts, or 10 speakers at 10 watts, or even 20 speakers at 5 watts each.



If the speakers were connected to the amplifier without the use of transformers, the below example would cause distortion and short out the amplifier.



If each speaker is rated at 8 ohms, the impedance to the amplifier would be: 2.6666 ohms  
This would definitely damage the amplifier.

Speaker impedance is calculated by the following formula:

$$\frac{1}{\frac{1}{Speaker\ 1} + \frac{1}{Speaker\ 2} + \frac{1}{Speaker\ 3}}$$

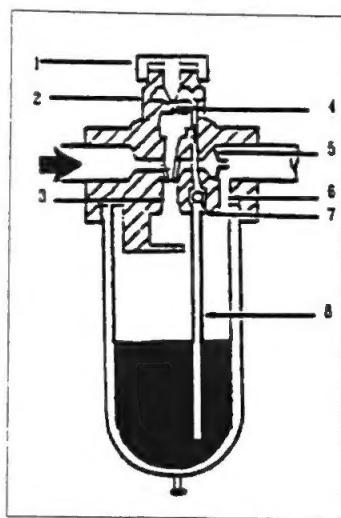
## The Lubricators -To lube or not to lube

When the 3 stage animation was developed, it was thought that a constant mist of oil would be needed to constantly lubricate the Mac valves and cylinders. After time, it has been found that this is not necessary.

Mac valves come from the factory pre-lubricated with a pneumatic grease. This grease does not need any additional help (Mac Valves, Inc. recommends that no additional lubrication is required for operation). To keep the Mac valves (and the cylinders) functioning under the best conditions, all we need to provide is a clean, dry air supply.

You may stop filling the lubricators with oil and let the lubricators run dry. There is a small catch; when the lubricators run dry, the air will slowly push the oil out of the system. During this time, several Mac valves may need to be cleaned and rebuilt, as well as some cylinders. Once this 'transitional' phase has passed, problems with the Mac valves will be minimal if any at all.

When rebuilding a cylinder, or a Mac valve, use denatured alcohol and a shop towel to clean the parts, and lube the parts with a pneumatic grease. I recommend using the Dow Corning 55 O-Ring lubricant. This great lubricant is available from our parts department (Part #: M00892).



The Microfog lubricator.

## **60 Minute Emergency Backup Tape**

The 60 minute emergency backup tape is a cassette made for use with a standard home hi-fi vcr. By utilizing the two audio outputs from the vcr, it is possible to play a show without the use of the JVC BR-7000.

Remember: The animation computer cannot rewind, stop, or activate play on a home hi-fi vcr. This must be done manually.

This tape can only be played when the animation computer is in VCR Adjust mode.

The Following connections must be used for the emergency tape to be used with a home hi-fi vcr:

**Left Audio output** - Data Signal for animation computer. Connect this port to the rca male connector on the transport connector (1&2 stage shows).

3 stage shows need to connect this port to the lead running to the DATA 2 port on the 3 Stage animation computer.

**Right Audio Output** - Show audio track. Connect this port to the cable that runs to the L1 connector on the AV routing switcher.

Computer must be in VCR ADJUST mode prior to activating play on the vcr.

**For 1&2 Stage shows:** the PROGRAM button on the Managers control panel must be pressed, after VCR ADJUST mode is activated.

The Emergency Backup tape can be played on the JVC BR-7000 as well, though if the JVC BR-7000 is working, there is no need to run this tape through. The showroom audio connection would have to be moved to RIGHT Hi-Fi for this operation, though.

## **Recommended tape inventory**

The below is a list of tapes that need to be kept in stock and in good working condition at all times.

- **Current Regular Showtape**
- **Current Live Showtape**
- **Best Of CEC TV** -This tape is used when there is a problem with the current regular showtape. Use this cassette until you receive a replacement for another regular showtape.
- **60 Minute Emergency Backup** - This tape is used when there is a problem with the vcr. You can run the show using a home hi-fi stereo vcr with this cassette. Place the computer in vcr adjust mode, hook the data line into the left output and the showroom in the right output (Tape must be manually rewound and started).
- **Emergency Backup Birthday -3 Stage** -This tape is to be used in conjunction with the 60 minute emergency backup tape. This allows for a birthday show to be played if you are using the 60 minute emergency backup showtape. This tape is currently only available for 3 stage shows.
- **Diagnostic Tape** - This cassette is used to align the movements of your show to the show in the studio where the shows are programmed. This tape is also a great aid in troubleshooting movements and special effects.
- **Chuck E. Says** - Generic Live Tape. Can be used as a live backup.
- **Fiesta Mexicana** - Generic Live Tape. Can be used as a live backup.
- **Chuck E. Shuffle** - Generic Live Tape. Can be used as a live backup.

## **Recommended Chip Kits**

CHIP KIT	PART NUMBER	PRICE
68HC11 CPU -Single and Double Stage	005-0002-40	\$10.93
Triad Computer -3 Stage	005-0053-80	\$9.40
A/V Switcher	005-0054-80	\$12.85
Character/AV/Light driver board	005-0021-090	\$6.33
Long Driver Bd	005-0068-10	\$8.05

## **Surge Supressor**

Please check all power strips used on the animation are in good shape (No loose connections to the outlets, breakers work All ground plugs intact), and that a good spike protector is installed. We recommend the Tripp-Lite Isobar 15amp line filter/spike protector. These are available from Jameco Electronics for \$44.95 To order from Jameco, call 800-831-4242. The part number is: 18981.